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AUTHOR Nyhuis, Jane
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ABSTRACT

Referring as often as possible to traditional Hopi practices and to materials readily available on the reservation, the illustrated booklet provides information on the care and maintenance of young fruit trees. An introduction to fruit trees explains the special characteristics of new trees, e.g., grafting, planting pits, and watering. The different varieties of apples, apricots, grapes, pears, peaches, and plums that are recommended for Hopi country are listed. Information on buying and storing the trees includes suggestions on how to store and to heel in the trees. A description of the steps for planting fruit trees covers choosing a planting site, digging holes, making a root support, root pruning, planting the tree, replacing soil and watering, staking the tree, and pruning the newly planted tree. Next, the booklet explains mulching, fertilizing, watering, whitewashing, basic pruning, and how to properly prune apples, pears, peaches, and apricots during the first spring and after the first year. Suggestions are provided for dealing with animals, birds, insects, diseases, wind, and frost. Examples of effective preventative measures for wind and frost are described. The booklet concludes with a troubleshooting guide which provides information on the tree part, symptoms, possible cause, and cures. (NQA)

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The Hopi Fruit Tree Book

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The Hopi Fruit Tree Book

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Written by
Jane Nyhuis

Illustrated by
Susi Partlow

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INTRODUCTION

Until recent years, Hopi mesas and hillsides were full of healthy, productive fruit trees. Older Hopis have vivid tales to tell about the old, traditional orchards. According to some storytellers, certain areas were completely covered with peaches, apricots, pears and apples. These fruits were highly prized by the Hopi and were like candy to both children and adults. Summer and fall harvests were usually so plentiful that large amounts of the fruits were dried on rocks and rooftops and used all year.

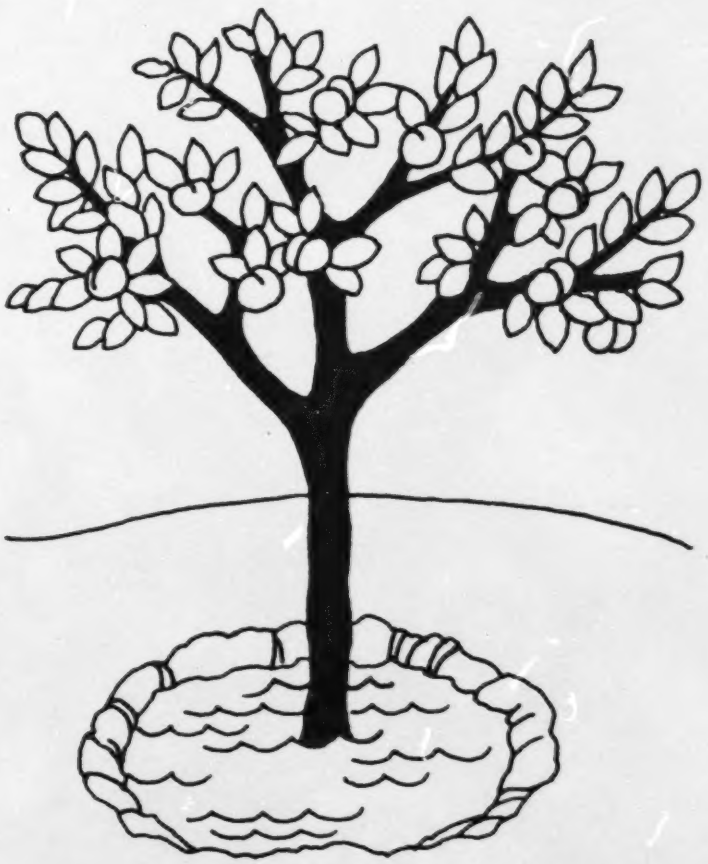
Unfortunately, the old fruit trees have begun to dry up and die. The once productive orchards have been reduced to a few scraggy trees. The small amount of fruit produced each year is usually sacrificed to birds and passing children. No one knows exactly why the trees dried up, but it is a good bet they are simply too old to produce anymore.

Last year the Bureau of Indian Affairs/Land Operations Office, in Keams Canyon, became concerned about the loss of the old Hopi orchards and started a series of events that led to the planting of hundreds of new trees. A survey conducted by the BIA indicated that most orchard owners wanted to restore their plantings but were uncertain how to begin or lacked the ability to undertake such a task.

The BIA then decided to contact Meals for Millions/Freedom from Hunger Foundation (MFM/FFHF), a non-profit, nutrition foundation that has worked extensively with other Arizona Indian communities. MFM/FFH agreed to assist the BIA and Hopi farmers restore the old orchards by locating funds for a large purchase of trees as well as by providing technical advice and educational materials.

MFM/FFHF representatives then visited many Hopi families and discovered that peaches and apricots were preferred over all other fruits and missed the most. An order for many different kinds of peaches and apricots was then placed. After the trees arrived on the Reservation, the BIA organized and assisted with planting activities in many Hopi villages.

A successful renovation program, however, must also include instruction on the care and maintenance of the young trees. It is the goal of MFM/FFHF, in preparing this booklet, to provide detailed information on fruit tree care. A considerable effort has been made to refer as often as possible to traditional Hopi practices and to utilize materials readily available on the Reservation.



AN INTRODUCTION TO FRUIT TREES

New fruit trees, like those recently planted on the Hopi Reservation, are very different from the trees planted in the Hopi orchards over 100 years ago. The old trees needed little attention and would give large harvests almost every year. The new trees will give large harvests too, but they will require much more care and some knowledge about their special habits.

The special characteristics of new fruit trees are explained below. Careful consideration of these points will ensure healthy trees and large harvests of fruit.

- Grafting: fruit trees are now actually two trees in one. There is a bottom part and a top part that have been joined together, or <u>grafted</u>, near the bottom of the tree. The place where these two parts were joined is the graft. After the trees are planted, the graft should be about two inches above the ground. Grafting makes trees very strong and productive. Fruit comes from the top part. If branches are allowed to grow from the bottom part, the fruit will probably taste very bad.

Modern fruit tree with graft showing near ground level

- Varieties: there used to be only a few different kinds of each fruit tree. Hopi orchards, for example, usually contained only freestone

Tree with branches growing from the ground

and white-meated peaches. Now there are many types of fruits. There are hundreds of different apples, peaches, apricots, and pears. There are also many different grapes and plums. All these different types have names and the name is the tree's variety. Each variety has been developed for a special area or purpose. It is very important to get trees developed for areas with a climate like that found on the Hopi Reservation.

- Planting Pits: In the old days, pits from the fruits were planted in cans then placed back in the orchards when the trees they produced were a year old. This is a good way to make orchards larger. However, pits from the new trees should not be planted in the orchard. One strange habit of modern trees is that they do not produce the same kind of tree from the pits. Trees will grow from the pits, but any fruit produced will probably taste very bad. Do not plant pits from the new trees.

- Water: new varieties would greatly appreciate being watered once in a while. Young trees will especially benefit from a good watering.

Watering a fruit tree

FRUIT TREE VARIETIES

There are many kinds of fruit trees that will grow well in northern Arizona. On the Hopi Reservation, apples, peaches, pears, and apricots have been successfully grown for a long time and are still popular. Grapes and plums will also grow. Fruits that do not grow well are citrus, dates, figs and cherries.

If planning to purchase fruit trees at a nursery, pay close attention to the variety name on the tree. Many varieties will not do well on the Reservation. Some would like colder weather and others are more suited to hot dry deserts.

Below is a list of tree varieties that are recommended for Hopi country. When buying trees, pick any from this list. However, it is always a good idea to purchase at least two different varieties of each fruit. If growing apples and pears, two varieties MUST be purchased. One variety, by itself, would not produce any fruit.

Recommended Varieties

Apples: Gravenstein, Lodi, McIntosh, Golden Delicious, Red Delicious, Jonathan, Winesap, Rome Beauty, Newton Pippen, Grimes Golden.

Apricots: Tilton, Sun Gold, Wenatchee, Perfection, and Goldrich.

Grapes: Concord, Niagra.

Pears: Summer Bartlett, Anjou.

Peaches: Regina, Summerset, Red Globe, Rosa, Elberta, Red Haven, Hale Haven, Rio Oso Gem.

Plums: Santa Rosa, Satsuma, Burbank.

BUYING AND STORING FRUIT TREES

Fruit trees are sold either bare-rooted or in containers. Bare-root trees are usually wrapped in plastic or sold in boxes that have been filled with sawdust. There is no soil around the roots, so there is always a danger that the roots will dry up and die. Container trees are sold in large pots or cans that have been filled with soil. There is far less danger of these trees drying up.

Bare-root tree

Ideally, all trees should be planted immediately after they are purchased. This reduces the possibility that they will dry out. However, if trees must be stored for a short period of time, have a system ready before the trees are brought home. Plan to store the trees according to the following suggestions:

- Never store fruit trees in the house. The warm temperatures could fool the trees into blooming. Garages and carports may also be too warm.

- Choose a cool spot outside that is protected from the wind, horses, cows or other animals.

Tree bought in a container

- Bare-root trees that are to be stored only a few days should be moistened and then left in the original packaging. Open up the box or plastic, wet root area carefully, and close packing tightly. Then cover the root area with a towel, box, more plastic, or anything that will help keep the roots wet.

Box of bare-root trees

- Bare-root trees that must be stored more than a few days should be heeled in. This is a simple process and will not hurt the trees if they are handled gently. Instructions are given below. Don't forget to always lift trees by the trunk and not by the roots.

Heeling In Trees

Heeling in trench

- Dig a trench about 1½ feet deep and 1 foot wide. Choose a protected spot away from harsh winds and extreme sunlight.

Trees in trench

- Open up bare root trees, lift by the trunk. Place in the trench at an angle, pointing towards the sun.

Filling in trench

- Loosely fill in the trench with sand, straw or sawdust. Do not pack.

Carefully watering trees

- Gently water trenches and keep moist at all times. Never flood trenches, however, since over-watering can kill the trees.

Lifting tree by the trunk

- Carefully work loose each tree at planting time. Lift only by the trunk.

PLANTING FRUIT TREES

Careful and correct planting of fruit trees is well worth the extra effort and time. If done in a hurry and without proper advance preparation the tree probably will not survive the first summer. Some advance planning and a small amount of care will produce healthy and happy trees that will give good harvests for many years.

The steps for planting fruit trees are described below in detail. Follow them carefully. For the greatest success, choose the planting site, then prepare planting holes before the trees are brought home. Trees are usually purchased in the spring then planted immediately. This greatly reduces the chance of them drying out.

- Choosing a planting site: Look first where the old trees were planted. These locations are probably the best. The old orchards were usually in full sun, near natural water seepage points, and somewhat protected from the wind. Also, the trees were never planted in low spots where they might easily freeze. The huge harvests the old trees gave is proof enough that these were good spots for an orchard.

Orchard trees planted on a slope

- Dig holes: Each tree needs a new hole. Never plant where an old tree has been dug up. Dig holes about 1½ feet deep and 1½ feet wide. The size will vary

somewhat, depending on the size of the roots. The object is to make a hole wide enough to loosely contain the roots and deep enough to keep the graft about 2 inches above the ground. Space holes 20-25 feet apart.

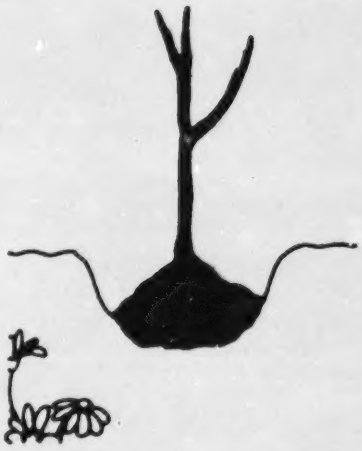
- Make a root support: If the tree roots are a wide, fan shape, make a root support. This is done by mounding a small amount of soil in the hole bottom. If trees have a long, central root, do not make a support.

Planting hole with mounded dirt for root support

- Root Pruning: Lift up the tree by the trunk. If any roots are scraggy and broken, cut them off with something sharp like a scissor, shears, or a razor blade. Do not break roots barehanded.

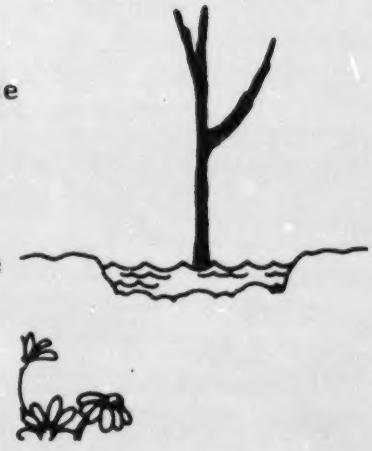
Inspecting for damaged roots

- Planting Tree: Gently place fruit tree in the hole. Distribute roots over the support. Make sure the trunk is straight.



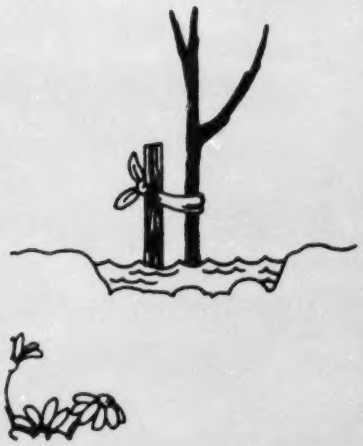
Planting tree

- Replacing Soil and Watering: Replace most of the soil, then water well. This will settle soil around the roots. Add remaining soil, leaving a small amount to form a basin. The basin will trap water near the tree roots.



Tree well with basin

- Staking the Tree: New trees must be staked, especially in a windy area like the Hopi Reservation. Use any materials that might be lying around, like sturdy branches, old broomsticks, lumber or pipes. Push any of these about 8 inches into the soil, near the tree trunk. Tie tree to the stake. Do not pull ties tight. Tighten just enough to keep the tree from wobbling in the wind.



Newly planted, staked tree

- Pruning: New trees should be pruned immediately after planting. This means cutting away part of the trunk or branches. Plan to cut new trees by about 1/3 of their total length. If a tree is 3 feet, cut away 1 foot. Look for a bud near the 1 foot mark and cut right above the bud. Do not cut through the bud or at an angle. Cut straight across.

Incorrect pruning cuts

Correct pruning cuts

FRUIT TREE CARE

Many people prefer to ignore the young fruit trees after the orchard is planted. High hopes are all the trees get. Others, however, carefully watch the trees and do things that will help them survive. It is these people who are rewarded with a big harvest. The more care given to the trees every year, the more they will give in return. Some good practices to follow include mulching, fertilizing, and pruning. Watering, if possible, will greatly help, especially if trees are planted in a very dry area. An explanation of these important practices follows.

Mulching

Mulching means laying down a thick layer of leaves or other material under the tree. Mulching helps trap water and keeps trees cooler in the summer. Mulch will also help stop wind erosion and root exposure. In addition, mulch acts as a cushion for ripening fruit that falls to the ground.

Leaves as a mulch

Many materials can be used as a mulch. If other trees are nearby, save their leaves each fall. Sawdust also works well. Newspapers and old plastic bags will work also.

Materials that are not good for mulching include corn stalks, tree limbs, boards, and other large materials. These do hold in water, but they will also act as a nesting place for small rodents and insects. This should be discouraged.

Newspaper mulch

The best time to mulch is in the spring, after the ground has warmed up. If mulched earlier, tree growth can be slowed. Then, keep trees mulched all summer and into the fall. Replace old mulch every year.

Fertilizing

Trees, like people, must have enough of the right foods if they are to be healthy. Often, food is already in the soil for the trees, but if it is not there the trees will become sick and weak.

If the fruit trees do become weak, however, they can be fed. This is called fertilizing and will quickly perk up sick trees. Healthy trees like to be fertilized too, and will end up giving bigger harvests if fed occasionally.

Besides feeding the trees, fertilizing is important because it makes the soil richer. Much of the soil on the Hopi Reservation is already fairly good, but it often has a high pH. Plants like lower pH and will give better yields if an attempt is made to lower the pH. Fertilizing is often the quickest way.

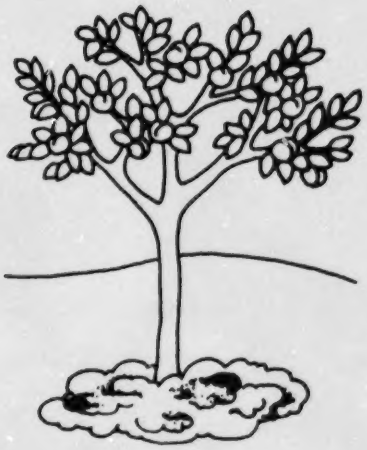
Stores and nurserys sell alot of fancy fertilizers for fruit trees. The type used by Hopi grandparents, though, is probably the best. Those with horses, cows, chickens, or other animals would save the manure. Animal manure, except dog manure, is loaded with the foods and vitamins that plants like. Animal manures also have things that lower soil pH. The old method of fertilizing, as well as some new ideas, are outlined below.

- Place about 3 inches of manure in the tree basin each spring. Water tree by filling in basin, slowly, with water.

- If manure is less than 1 month old, use only 1½ inches; otherwise, the tree roots might bet burned.

- Use manures in the spring and summer months only. Never fertilize in the fall.

- Coffee grounds and eggshells are also excellent fertilizers. Unlike manure, these materials can be placed around the tree all year. If mice or other small animals become troublesome, stop using these materials. Never use any other type of garbage directly on trees.



Tree basin filled with manure

Watering

Most of the old orchards were planted in wet areas, where water naturally came out of the earth. These trees had all the water needed for good growth.

New trees that are planted in dry areas will not be able to grow on their own. They will need some water, at least occasionally, especially the first few weeks after a tree is planted. This period is absolutely crucial, and watering at this time will greatly increase a tree's chances for survival. Older trees need water too, especially during dry spells, so figure out a way to help the trees along. Below are some suggestions.

- Build a basin around the tree about 6 inches high. This will trap water near the tree.

- If a hose is nearby, fill the basin slowly, to the top.

Watering a fruit tree with a hose

- If watering with buckets, add 2-3 buckets to each basin.
- Never overwater. This is as bad for a tree as a long dry spell.
- Before watering again, stick a finger all the way into the soil. If dry, water again, soon.
- Trees especially like water in the early spring, again after the bees have left, and again before the weather gets very cold in the fall.
- More frequent watering is even better, especially for newly planted trees.

Watering with a bucket

Whitewashing

Whitewashing is often done to protect tree trunks from being sunburned. This is usually done by covering the trunk with a white water-base paint. The paint blocks out the sun and, if done properly, will not hurt the trunk. Many people feel that whitewashing will also reduce insect and disease problems.

If orchard trees mostly face south, then whitewashing is advisable. It is especially important for young, exposed trees. Always use water-based, latex paint. Never use an oil-based paint. This will clog up the tree's breathing holes. Thin down the latex paints and then apply with a brush.

Whitewashing a tree

Fruit tree protected from the sun with plywood

If white paint is not available, trees can be protected from the sun by wrapping the trunk in a protective material that will block the sun's rays. Try using newspaper, towels, old sheets, or paper bags. Plastic is not recommended. Tie the material loosely around the tree. Wood, propped up against the south side of the tree will also provide some protection.

Pruning

Pruning means cutting away twigs or whole limbs from the trees. Often, tree owners forget to prune, but it is very important and should be done each year. Trees become much stronger, more productive, and longer-living after pruning. Then, these stronger, healthier trees are much better at withstanding winds, insects, and diseases. Pruning will also help the tree to give better quality fruit.

Pruning a fruit tree

Many fruit growers are afraid to prune. The task is actually easy and there is no reason to feel alarmed. Pruning becomes even easier after some practice. After reading the following suggestions and looking at the pictures, you should feel confident enough to give pruning a try.

Basic Pruning Information

- Fruit trees are not all pruned in the same way. Mature apples, pears and nuts need to have a strong central

trunk. Notice in the picture at the right that there is one large, dominant trunk in the center of the tree. The other main branches are smaller and off to the side of the main branch.

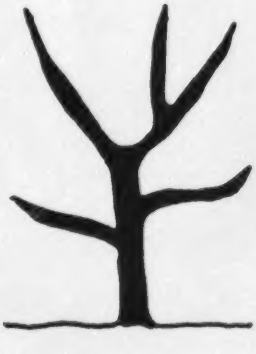
Central leader tree

- Mature peaches and apricots do not have strong central branches. Instead, they are pruned to a vase shape, with several main supporting branches. Notice in the picture at the right that there are four main support branches with several smaller branches off them. Vase-shaped trees are usually as strong as the central leader type described above, but they are usually not as tall.

Vase-shaped tree

- Pruning cuts made during the first few years should always be done just above a bud. Do not cut through the bud or at an angle, but straight across.

- Keep branch angles narrow. Side branches that meet the main trunk are much weaker than those that come in at more narrow angles.



Incorrect branch angles

- After a basic shape is made, never cut back a main branch unless it is badly diseased or broken. Cut only scraggy sprouts, broken branches and sprouts near the base of the tree. Shoots coming out of the ground should also be cut away.

- Make clean, sharp cuts and always cut upward.

- Always wash tools first to prevent the spread of disease. Wash tools by soaking in a bucket of water that has a few tablespoons of bleach added.

- Special pruning shears do the best job, but sharp knives and saws will also work.

Pruning tools

How to Prune

Once you have decided where to cut, simply snip or saw off these branches. It is really quite simple. Then, if you have some left over whitewash, tar or caulking, smear a small amount over the cut. To help you in deciding where to make the correct cuts, we have shown how each type of tree is trimmed. The black markers on the tree branches indicate where cuts are to be made. The pictures next to those with the black markers show how the trees will look after pruning.

Pruning newly planted trees:

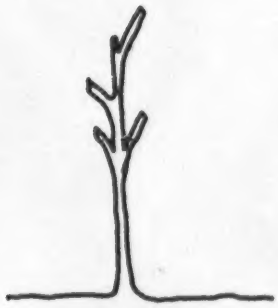
Before pruning

After pruning

Proper pruning during the first spring

Peaches and Apricots:

Before pruning



After pruning

Apples and Pears:

Before pruning

After pruning

Proper pruning after the first year

Peaches and Apricots:

Before pruning

After pruning

Apples and Pears:

Before pruning

After pruning

INSECTS, DISEASES AND OTHER FRUIT TREE PROBLEMS

Fruit trees are always subject to some problems or damage. Birds, rodents, livestock, insects and disease are all potential threats to a fruit tree. On the hard Hopi lands, winds and spring frosts may also prove troublesome.

When faced with any of these problems, try to avoid getting discouraged. There are many ways to deal with much of the trouble. Suggestions for each type of pest or problem are given below. However, it is important to note that the best way to deal with any potential problem is through prevention. Try to anticipate potential problems and plan ways to prevent the worst from happening. Following good cultural practices, like those explained in the last section, will greatly minimize problems.

Animals

Kangaroo rats, squirrels and mice may be a problem on the Hopi Reservation. Cats, untended sheep, and cows could also be bothersome. However, animals are probably the easiest problem to deal with effectively. A physical barrier is all that is usually required.

Fancy materials are not needed to fence out animals. Look around the house and yard and use what is available. Some examples are shown in the following drawings:

Fence made of branches

Fence made of corn stalks

Chicken-wire fencing

In addition to making barriers, animals can be discouraged by keeping litter and debris away from trees. This material provides a great nesting place for small animals. Fill water basin partially full with rocks if mice become a problem.

Birds

Birds are far more difficult to control than the animals mentioned above. They can do considerable damage in a short period of time and are not easily scared off.

There are a few things, however, that can help you minimize damage caused by birds. However, before you attempt to control birds, watch those in your orchards for a while. Some types are not going after the fruits at all, but are eating insects that may have been living on the trees. These birds are friends and are doing a big favor.

These 'good guys' can be easily distinguised from the 'bad guys.' The insect-eating birds have long, sharp beaks, either curved or straight. This makes it easier for them to get at insects. Swallows, wrens, hummingbirds, warblers, martins, woodpeckers, and bluebirds are all good birds. Don't scare them off.

Crows and ravens, on the other hand, are not great to have around. They nibble on young leaves and devour maturing fruits. If these birds become a severe problem, control measures will be needed. Please note, though, that you will never be completely rid of these birds and may have to strike a compromise by giving the crows and ravens at least some of the fruit. Other suggestions for controlling birds are listed below:

- Protect each fruit individually. They can be wrapped in cloth strips or paper bags. Old stockings also work.

- Hang strips of tin foil from the branches. This sometimes scares birds off.

- Teach a dog to chase birds. An active dog is one of the best bird controls around.
- Wrap the entire tree with bird netting. This is sold in nurserys and is expensive.
- Hang little bundles of mothballs from the branches. The smell of the mothballs is unpleasant to many birds.

Insect and Disease Problems

Fortunately, there are very few insect or disease problems on the Hopi Reservation. The dry, windy climate seems to discourage either from staying long.

On occasion, though, insects or disease will appear on the fruit trees. If the infestation is mild, don't worry. Other wildlife, like spiders, snakes and birds will probably keep things under control.

In the slight chance that insects or diseases get completely out of control, try one of the control measures listed below. Avoid all temptations to use chemical sprays. These are expensive, and usually not needed in the home orchard. Instead, use imagination and materials already available around the house.

- Handpicking Insects: In a home orchard or garden, most insect problems can be controlled or avoided by picking the critters off the tree and drowning them in a bucket of water. Keep a bucket on hand for this purpose. If grubs bore into the trunk, pluck them out with a wire and drown them in water. Seal large holes with caulking.

- Keep Orchards Clean: Insects and diseases love clutter and debris. It provides nice hiding places and a good safe location to lay eggs. Therefore, try to keep

debris away from trees. This includes boards, tires, cans and bottles. Also, clean away any fruit that rots on the ground. Removing large patches of weeds will also help.

- Keep Trees Healthy: Unhealthy and uncared for trees are far more likely to be bothered by insects and disease. If you have manure, lay some around the tree each year. If the summer is unusually hot, try to water trees occasionally. Regular yearly pruning will also keep trees healthier.

- Remove Diseased Parts: If a portion of the tree becomes heavily infected with a disease, immediately prune away those branches or limbs. Then burn or haul these parts away. Paint the pruned edges to prevent reinfection.

- Non-toxic Sprays: Several harmless substances can be used for insect control. Don't use the toxic chemicals sold in the stores as insecticides. Instead, try dormant oils, Dipel Dust, and dusting sulphur. All are available at a good nursery.

Dormant oils are very effective against aphids, red spider mite, thrips, mealybugs, whiteflies, and some moths. However, they are only used when the trees are in the leafless, dormant stage. If used when trees have leaves, the tree will be severely damaged.

Dipel Dust is harmless to us but will make insects very sick. Dipel is especially helpful against many worm-like insects that crawl on the leaves. It is not expensive and is very effective.

Dusting sulphur helps control both insects and diseases and is also very inexpensive. Especially helpful against mealybug and scale problems.

- Home Remedies: Long before garden nurserys sold dust and sprays, fruit tree owners had to deal with problems. They usually used whatever was available in the house or outside. Some of the more successful home remedies are soap sprays and hot sauce sprays.

Soap sprays are made by mixing about 1 tablespoon castile soap in one quart of water. Then, place in a plastic spray bottle and cover infested areas. Soap sprays can also be poured on or spread with a turkey baster. Use every other day for a week, and again after a rain.

Hot sauce sprays can be made by using whatever spicy or hot things that might be in the kitchen. Try mixing together 1 tablespoon garlic powder, 1 tablespoon chili powder, and 1 tablespoon pepper in one quart of water. Let stand overnight. If using a spray bottle to apply, strain before using. Otherwise, just pour directly over the leaves. Use every other day if insects are troublesome, making sure to respray after a rain.

Wind Protection

The frequent and fierce winds that blow across the Hopi Reservation are likely to cause severe problems in the orchard. The winds can leave roots exposed and can quickly dry out or uplift young trees.

As usual, prevention is the best way to deal with wind problems. Assume that winds will be troublesome and figure out a way to protect the trees before the damage is done.

Examples of effective preventative measures are described and illustrated below.

- Plant in a Protected Spot: Pick a site that offers some natural protection when the trees are first planted. Don't place them on a fault or open area where the wind will quickly knock them over. Pick a gentle, northfacing slope or slightly indented wash.

- Stakes: New trees should definitely be staked. Use whatever materials are available and loosely tie tree to the stake.

- Rock Mulches: Rocks placed around the base of the tree will reduce wind damage and exposure of the roots. Use small rocks and fill basin only half way.

- Hedgerows: Hedgerows are long, natural windbreaks formed by planting a line of sturdy trees. They have been used a long time to protect plantings. Russian Olive and Hackberry are trees used for windbreaks on the Hopi Reservation. These will work well as a hedgerow for an orchard. If a windbreak already exists on your land, plant the trees in an area that will take advantage of this protection.

- Fencing: Some kinds of fencing can also reduce wind damage to fruit trees. If you save corn stalks during the last year's harvest, these can be woven into a sturdy windbreak. If you have only a few stalks, make individual fences for each tree. Large boards, propped up against the wind will also provide some protection.

Cornstalk fence

Board propped against tree

Frost Protection

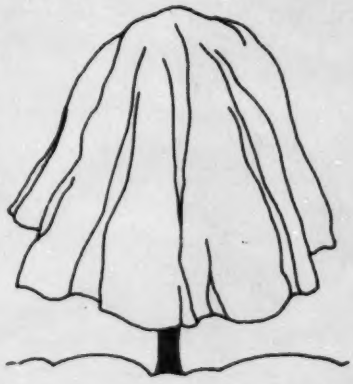
Frost damage is the most likely to occur in the fall or spring. When cold weather hits in these periods, the trees are not able to protect themselves. During the regular winter months, the trees are completely dormant and are not usually bothered by frosts and freezes. In the spring, all trees are susceptible to frost damage, but it is especially troublesome for young trees.

If the weather turns cold and a frost is expected in the fall or spring, plan to protect fruit trees. Like people, these trees need to be kept warm if the nights get too chilly. The easiest protective measures are explained below.

- Don't feed trees in the late summer or early spring. This will delay dormancy in the fall and encourage sprouting in the spring.

- Wrap Young Trees in Blankets: Sheets or any fabric will work also. This will help trap the warm air around the tree.

- Prop Up Boards Around Trees: Often, this will help trap in heat. Remove boards and other materials during the day.



Tree protected by sheet

- Wrap Trunks in Paper: Loosely tie newspaper or any other type of paper on hand around the tree.

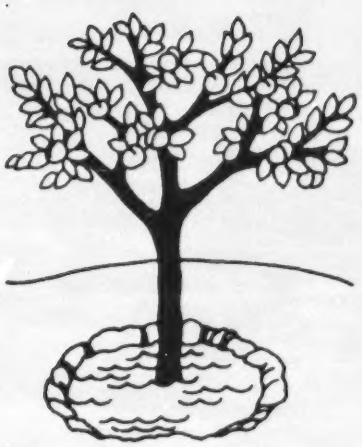
TROUBLESHOOTING GUIDE

The following table has been designed to help you determine what problems are damaging your fruit trees. For example, if tree leaves are covered with fine, silky spider webs, look in the section on Leaves under the heading TREE PARTS. Then look at all the symptoms listed until yours is found. Possible causes and cures for these problems are then listed.

TREE PART	SYMPTOMS	POSSIBLE CAUSE	CURES
Trunk & Bark	Swollen lumps on tree, usually near soil line	Disease (Crown Gall)	Remove galls with a knife, then paint opening
	Hole in tree bark	Insects (Borers)	Poke a wire into hole, remove insect, then fill in hole with caulking
	Scratch marks on tree bark	Mice, rodents, cats or other animals	Protect tree with fence made of cornstalks or other materials
	Bark peeling on south side of tree	Sunburn	Whitewash exposed trunk or wrap with paper
Branches	Small sprouts or branches grow from base of tree or ground	Occurs naturally	Prune off all these sprouts; they will not produce good fruit
	Dead branches or limbs on tree	Old age, disease or frost damage	Prune off damaged parts and paint cut areas
	Broken branches	Improper pruning that resulted in wind damage	Prune off broken parts
	Tips of branches dead	Frost damage	Prune away dead areas

TREE PART	SYMPTOMS	POSSIBLE CAUSE	CURES
Leaves	Leaves very sticky and possibly covered with insects or ants	Insects (Aphids)	Apply soapy water spray, often; also, use dormant oil spray when trees are leafless
	Thin, spider webs on leaves	Insects (Spider Mites)	Apply Dusting Sulphur
	Leaves pale yellow with dark green veins	Lack of Iron	Feed trees with ironite
	Holes in leaves	Insects (worm types)	Dipel Dust
	White patches on leaves or fruit	Disease (Powdery Mildew)	Dusting Sulphur
Flowers & Fruit	Grey, fuzzy patches on flowers	Disease (Rot)	Cut off infected twigs, burn or completely destroy these parts
	Small, misshapened and poorly colored fruit, with little taste	Lack of pruning	Prune trees carefully, in the early spring before buds break open; remove dead branches and any shoots near base of tree
	Heavy fruit set on top of tree	Improper pruning	Prune tops lightly, to encourage side branching
	No fruit set	Frost damage or insufficient pollination	Prune trees as usual next spring and plan to protect from frost if the weather gets very cold in the late spring or fall
	Fruit dry and tough	Lack of water	Keep trees well watered during ripening

TREE PART	SYMPTOMS	POSSIBLE CAUSE	CURES
Flowers & Fruit (cont'd)	Fruit cracks open	Sunburn	Thin out fruits, every year, on the south side of the tree
	Fruit is brown near pit	Weather too hot while fruit is ripening	Keep trees mulched and well watered during hot spells
	Skin of fruit appears pitted	Late spring frost	No cure, except to protect trees if a frost is expected in the fall or spring
General Problems	Roots exposed	Wind damage	Place a rock mulch around tree base or plant hedgerows
	Young trees bending over	Wind	Stake each tree to a sturdy post
	Weak, spindly growth, little flowering or fruit production; pale colored leaves	Lack of food	Place manure around base of tree in the spring and mid-summer
	All leaves and tree wilting	Lack of water	Water trees as soon as possible and mulch with leaves or other material



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Foundation/Southwest Program
715 N. Park Avenue
Tucson, Arizona 85719

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